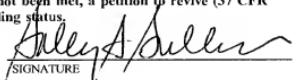


FORM PTO-1390 (REV. 2-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER 114-01	
INTERNATIONAL APPLICATION NO. PCT/AU00/00351	INTERNATIONAL FILING DATE 20.04.2000 (20 APRIL 2000)	U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/009157	
PRIORITY DATE CLAIMED 20.04.99 (20 APRIL 1999)			
TITLE OF INVENTION Method of and System for Controlling a Blasting Network			
APPLICANT(S) FOR DO/EO/US DRAGNE, Livia; PATZ, Vivian Edward; HOOGENBOEZEM, Christian			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ul style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). </p> <p>6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)) <ul style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). </p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ul style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. </p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(e)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p>			
<p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: Transmittal with Certificate of Express Mailing and Customer Number</p>			

U.S. APPLICATION NO.		INTERNATIONAL APPLICATION NO.	PCT/US00/00351	ATTORNEY'S DOCKET NUMBER 114-01																									
10/009157		CALCULATIONS PTO USE ONLY																											
<p>21. <input checked="" type="checkbox"/> The following fees are submitted:</p> <p>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1040.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00</p> <p>International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00</p> <p>International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00</p>																													
ENTER APPROPRIATE BASIC FEE AMOUNT = \$ 1,040.00																													
<p>Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(c)).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">CLAIMS</td> <td style="width: 25%;">NUMBER FILED</td> <td style="width: 25%;">NUMBER EXTRA</td> <td style="width: 25%;">RATE</td> <td style="width: 10%;">\$</td> </tr> <tr> <td>Total claims</td> <td>44 - 20 =</td> <td>24</td> <td>x \$18.00</td> <td>\$ 432.00</td> </tr> <tr> <td>Independent claims</td> <td>2 - 3 =</td> <td>0</td> <td>x \$84.00</td> <td>\$ 0</td> </tr> <tr> <td colspan="3">MULTIPLE DEPENDENT CLAIM(S) (if applicable)</td> <td>+ \$280.00</td> <td>\$ 280.00</td> </tr> <tr> <td colspan="4">TOTAL OF ABOVE CALCULATIONS =</td> <td>\$ 1882.00</td> </tr> </table>					CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	Total claims	44 - 20 =	24	x \$18.00	\$ 432.00	Independent claims	2 - 3 =	0	x \$84.00	\$ 0	MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00	\$ 280.00	TOTAL OF ABOVE CALCULATIONS =				\$ 1882.00
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$																									
Total claims	44 - 20 =	24	x \$18.00	\$ 432.00																									
Independent claims	2 - 3 =	0	x \$84.00	\$ 0																									
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00	\$ 280.00																									
TOTAL OF ABOVE CALCULATIONS =				\$ 1882.00																									
<p><input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SUBTOTAL =</td> <td style="width: 85%;">\$ 1882.00</td> </tr> </table>					SUBTOTAL =	\$ 1882.00																							
SUBTOTAL =	\$ 1882.00																												
<p>Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">TOTAL NATIONAL FEE =</td> <td style="width: 85%;">\$ 1882.00</td> </tr> </table>					TOTAL NATIONAL FEE =	\$ 1882.00																							
TOTAL NATIONAL FEE =	\$ 1882.00																												
<p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property + \$ 0</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">TOTAL FEES ENCLOSED =</td> <td style="width: 85%;">\$ 1882.00</td> </tr> </table>					TOTAL FEES ENCLOSED =	\$ 1882.00																							
TOTAL FEES ENCLOSED =	\$ 1882.00																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;"><input type="checkbox"/> Amount to be refunded:</td> <td style="width: 30%;">\$</td> </tr> <tr> <td><input type="checkbox"/> charged:</td> <td>\$</td> </tr> </table>					<input type="checkbox"/> Amount to be refunded:	\$	<input type="checkbox"/> charged:	\$																					
<input type="checkbox"/> Amount to be refunded:	\$																												
<input type="checkbox"/> charged:	\$																												
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$ 1882.00 to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-1969. A duplicate copy of this sheet is enclosed.</p> <p>d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</p>																													
<p>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.</p>																													
<p>SEND ALL CORRESPONDENCE TO</p> <p>Sally A. Sullivan Greenlee, Winner and Sullivan 5370 Manhattan Circle, Suite 201 Boulder, CO 80303 Telephone: (303) 499-8080 Facsimile: (303) 499-8089</p>																													
 <p><u>SIGNATURE</u> Sally A. Sullivan <u>NAME</u> 32,064 <u>REGISTRATION NUMBER</u></p>																													

10000157 001101
10/009157

JC10 Rec'd PCT/PTO 18 OCT 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Dragne, et al.:

Group Art Unit: Not assigned

Serial No.: Not assigned

: Examiner: Not assigned

Filed:

For: METHOD OF AND SYSTEM FOR
CONTROLLING A BLASTING NETWORK

CERTIFICATE OF MAILING	
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as Express Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231	
On	18 OCT 01
Lea Murray	
Lea Murray	
EL 827 992 173 US	
Express Mail Certificate Number	

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Commissioner for Patents

Washington, D.C. 20231

Sir:

Please amend the specification as follows:

In the Claims:

Please replace claim 7 with the following:

7. A system for controlling a blasting network which includes a control unit and a communication link for the network, the communication link being capable of being placed in a control mode and in an operational mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message, wherein the communication link in its control mode prevents any detected unsafe message from being transmitted to the blasting network and in its operational mode permits any previously designated unsafe message to be transmitted to the blasting network, and wherein in both its control mode and its operational mode the communication link permits any message which has not been designated as unsafe to be transmitted via the communication link.

Please replace claims 12-14 with the following:

12. A control system according to any one of claims 7 to 10 wherein the monitoring device is a filter.
13. A control system according to any one of claims 7 to 10 wherein the communication link is placed in its control and operational modes by means of a switch.
14. A blasting system including a control system according to any one of claims 7 to 10 connected to a blasting network.

Please add new claims 15-17:

- 15. A blasting system including a control system according to any one of claims 7 to 10 connected to a blasting network wherein the control unit of the control system is capable of generating legal unsafe messages, which are transmitted via the communication link in its operational mode.
16. A blasting system including a control system according to any one of claims 7 to 10 connected to a blasting network wherein the monitoring device of the control system is a filter.
17. A blasting system including a control system according to any one of claims 7 to 10 connected to a blasting network wherein the communication link of the control system is placed in its control and operational modes by means of a switch.--

REMARKS

This amendment is made to correct formalities with respect to the claims on entry into the U.S. National Stage.

Claim 7 is amended to correct a clerical error in the omission of the word "been."

The amendment corrects claims 12-14 so that these multiply-dependent claims no longer depend from multiply-dependent claims. New claims 15-17 are supported by original claim 14 and directed to blasting systems in which the control system has the elements of claims 11-13. No new matter is introduced by this amendment.

Claims 1-17 are now in this case.

This Preliminary Amendment accompanies Form PTO-1390. A check in the amount of \$1882 is included for the filing fee. No other fees are believed to be required. If the enclosed amount is incorrect, please charge any deficiency or credit any overpayment to deposit account 07-1969.

Respectfully submitted,



Sally A. Sullivan
Reg. No. 32,064

Greenlee, Winner and Sullivan, P.C.
5370 Manhattan Circle, Suite 201
Boulder, CO 80303
Telephone: (303) 499-8080
Facsimile: (303) 499-8089
Email: winner@greenwin.com
Attorney docket no. 114-01
SAS:lem:10/18/01

MARKED-UP CLAIMS

7. A system for controlling a blasting network which includes a control unit and a communication link for the network, the communication link being capable of being placed in a control mode and in an operational mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message, wherein the communication link in its control mode prevents any detected unsafe message from being transmitted to the blasting network and in its operational mode permits any previously designated unsafe message to be transmitted to the blasting network, and wherein in both its control mode and its operational mode the communication link permits any message which has not been designated as unsafe to be transmitted via the communication link.

12. A control system according to any one of claims 7 to [11] 10 wherein the monitoring device is a filter.

13. A control system according to any one of claims 7 to [12] 10 wherein the communication link is placed in its control and operational modes by means of a switch.

14. A blasting system including a control system according to any one of claims 7 to [13] 10 connected to a blasting network.

8-1098-10-IPMM-2326023.sps doc-1101340

- 1 -

10/009157
10 Rec'd PCT/PTO 18 OCT 2001

ART 34 AMDT

METHOD OF AND SYSTEM FOR CONTROLLING A BLASTING NETWORK

Technical Field

5 This invention relates generally to a blasting system and is particularly concerned with a method of and system for controlling the operation of a blasting network.

Background of the Invention

10 For safety reasons a blast controlling system used for remotely controlling a blasting network has traditionally been isolated from other networks at a blasting site eg. at a mine. The data on the blasting system can however be used to monitor productivity, implement stock control and improve mining methods by making blast information available to those who need such information. It is also possible to schedule and initiate blasts from a central control facility through a suitable blast controlling system.

15

Another possibility which arises particularly due to the fact that computers are being used as top level system controllers for distributed networks of blasters is to make use of a computer network using Internet or Intranet capabilities. There are however inherent risks associated with Internet connections. Chief of these is the risk that a hacker or unauthorised user may penetrate the system and deliberately or inadvertently generate an unsafe or dangerous command which can arm and fire the blasting system. This type of action can have catastrophic results.

25 Summary of the Invention

The invention provides a method of controlling a blasting network which includes the steps of designating at least one unsafe message, placing a communication link between a control unit and the network in a control mode in which the communication link is monitored for the unsafe message, in said control mode preventing the unsafe message, when detected, from reaching the blasting network, and placing the communication link in an operational mode in which any previously designated unsafe message is allowed to reach the blasting network, and wherein in both the control mode and the operational mode

ART 34 AMDT

any message which has not been designated as unsafe is permitted to be transmitted via the communication link.

The invention also provides a system for controlling a blasting network which includes a
5 control unit and a communication link for the network, the communication link being capable of being placed in a control mode and in an operational mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message, wherein the communication link in its control mode prevents any detected unsafe message from being transmitted to the blasting network and in its operational mode
10 permits any previously designated unsafe message to be transmitted to the blasting network, and wherein in both its control mode and its operational mode the communication link permits any message which has not designated as unsafe to be transmitted via the communication link.

15 Further according to the present invention there is provided a blasting system including a control system as described in the immediately preceding paragraph connected to a blasting network.

"Unsafe message", as used herein, is used to designate a message or command which, if
20 received by the blasting network, could result in unwanted or adverse conditions or consequences. For example arm and fire commands, if received by the blasting network at an unwanted time, could cause a blast to be initiated in the presence of personnel and thereby result in death or injury.

25 Preferably therefore the method of the invention includes the step of designating at least two unsafe messages of which two are respectively equated with arm and fire commands.

In the control mode of the communication link, the or each unsafe message may be
30 prevented from reaching the blasting network simply by ignoring the message and not allowing its onward transmission. Alternatively the or each unsafe message may be scrambled so that it is no longer in an unsafe form.

In the operational mode of the communication link, in which unsafe messages are allowed to be transmitted to the blasting network, any previously scrambled unsafe message may

ART 34 AMDT

- 3 -

be detected and unscrambled prior to transmitting the unscrambled unsafe message to the blasting network.

The control unit may be capable of generating legal unsafe messages, for example 5 legitimate arm and fire commands, which are transmitted via the communication link in its operational mode. However, unsafe messages may be categorised as legal or illegal. The latter group of messages includes those which are illegally generated, for example those messages which arise from any source other than the control unit connected to the communication link.

10

Brief Description of the Drawings

One embodiment of a control method and system according to the invention will now be described by way of example only with reference to the accompanying drawings in which:

15 Figure 1 is a block diagram of an electronic blasting system including one embodiment of a control system according to the invention;

Figure 2 is a block diagram of a communication fire wall for use in the control system of Figure 1;

Figure 3 is a logical flowchart of the operation of a filter, used in the control system of 20 Figure 1, according to a first form of the control system; and

Figure 4 is a flowchart similar to that shown in Figure 3 for a variation of the control system.

Description of Preferred Embodiment

25

When a blasting system is connected to an Intranet or Internet facility, access is provided to information stored in a data base associated with the blasting system. This information is useful inter alia to managers, personnel involved in stores and production, seismic monitoring installations, logistical control units, etc.

30

A perceived risk with a connection of the aforementioned kind is that unauthorised users may hack through the network security to tamper with the blasting system which is a safety critical system. An unanticipated system fault may result in the safety of the system being

compromised and this may lead to the blasting system being fired prematurely which can cause injury or fatalities.

Modern networks provide high levels of user security but due to the complexities of such 5 systems it is not always possible to carry out a complete exhaustive safety analysis of the control software, operating systems and associated fire walls.

Figure 1 of the accompanying drawings illustrates in block diagram form a system which 10 allows an Internet or Intranet connection to be made to a blasting network with improved safety.

The system includes an Internet or Intranet facility or connection arrangement 10, a blasting controller or control computer 12 which is used to control and activate blasts 15 remotely, a communication fire wall 14, a blasting network 16, and a variety of interrogating terminals 18.

The blasting controller 12 is used in a known manner and includes a standard device employed to control the network 16 and to activate the initiation thereof, remotely. These 20 aspects are known in the art and hence are not further described herein. Similarly the blasting network 16 consists of an assembly of detonators and communication devices installed in a known manner at a blasting site, making use of known technology.

The communication fire wall includes a locking device 19 for placing a communication link 20, which may be an electrical conductor, to the blasting network in a control mode, 25 or in an operational mode, according to requirement. As used herein the expression "locking device" includes any switchable component or mechanism which allows the fire wall to be made operational, or to be rendered inoperational, according to requirement. The locking device may be operated using a key, by means of an electronic keypad requiring a password, or it may be a remotely activated switch on a private connection. Thus, in a 30 general sense, the locking device may be mechanically or electronically operated.

The remote terminals 18 may vary according to requirement. The terminals may for example provide access, via an Internet connection, to the blasting network for managers 18A, stock controllers 18B, or a seismic monitoring unit 18C. These examples are merely illustrative and are not limiting.

5

Figure 2 illustrates further detail of the communication fire wall 14. The filter includes communication interfaces 22 and 24 which allow communication to take place with the communication link 20, an electronic filter 26 and, in this example, a locking device 19 which consists of a mechanical or electronic switch 28 which is activated by means of a 10 mechanical or electronic key 30.

The operation of the electronic filter 26 is described hereinafter with reference to Figure 3 and a variation of such operation is described with reference to Figure 4.

15 As indicated, by connecting the blasting system 16 to the Internet 10 a potential safety risk is introduced due to the possibility being created that hackers can penetrate the system. This risk is eliminated, or at least substantially reduced, by making use of the communication fire wall 14 to selectively filter out unsafe or dangerous commands like "arm", which results in the blasting network being armed, and "fire" which causes the 20 blasting network to be initiated.

It is to be noted that the communication medium and protocols used to communicate between the blast controlling system and the blasting network may be of any appropriate type capable of achieving reliable communication.

25

The communication interfaces allow the communication to interface with the electronic components incorporated in the filter 26. These electronic components may include a micro controller, programmable logic devices or discrete components. The choice of the electronic components is determined inter alia by the complexity of the communication 30 protocol which is used.

Referring to Figure 3, data on the link 20 (block 32) is received from the communication interface 22 and is input to the filter 26. The filter waits for communication (34) and reads each message on the line (36). If a message is unsuccessfully read then the system returns to the mode at which it awaits communication.

5

Once a message is successfully read (block 38) a test is carried out to see if the filter 26 has been deactivated (step 40) to place the communication link 20 in its operational mode. As noted, the filter is deactivated by means of the mechanical key 30. When the filter is deactivated the communication link 20 is capable of transmitting designated unsafe or 10 dangerous messages, such as arm and fire commands, which have been legally generated by means of the blasting computer 12, to the blasting network 16. Thus if the filter has been deactivated (step 42) any message received, regardless of its origin, is collected (block 44) and transmitted via the communication interface 24 as output data (46). The system then reverts to its waiting mode at which further messages are awaited.

15

On the other hand if the filter 26 is activated so that the communication link is in its control mode, any message received is tested to see whether it is safe or unsafe (step 48). Safe messages are collected and transmitted on the communication link (steps 44 and 46) to the communication interface 24. If a designated unsafe message is detected, it is 20 collected but simply ignored (step 50). The system then reverts to the mode at which it waits for further communication.

25 If an unsafe or dangerous message is detected with the filter 26 activated then an alarm signal, visual or audible, is generated. A count is also kept of the number of unsafe messages detected.

With the control steps shown in Figure 3 the logic is such that unsafe messages which are detected when the filter is activated are assumed to be illegally generated and are ignored. Other messages are transmitted to the required destination via the communication interface 30 24. The system thus possesses the facility for allowing data associated with the blast network to be accessed from the remote points 18. The data may be located at the blasting controller 12 or at the blasting network 16. It is however not possible to transmit a

designated unsafe message to the network 16 unless the communication link 20 has been placed in its operational mode, ie. unless the filter 26 has been deactivated.

In the logical sequence shown in Figure 4 many of the steps are similar or identical to 5 corresponding steps in the sequence shown in Figure 3 and consequently bear the same reference numerals. The flowchart shown in Figure 4 is however intended for use with a blasting controller 12 which scrambles designated unsafe messages. Thus, legally generated arm and fire commands, produced by the controller 12, may be transmitted to the blasting network 16 in a scrambled state when the filter 26 is activated, but these 10 scrambled messages will be ignored since they will not be understood by the blasting network as arm and fire commands.

In the step 40 a test is carried out to see if the filter 26 is deactivated (ie the communication link 20 is in its operational mode) or activated (ie the communication link 20 is in its 15 control mode). In the latter case a test is then carried out on the received message to see whether it contains a designated unsafe or dangerous command such as "fire" or "arm" (step 52). If the message is unsafe then, in step 54, the command is scrambled whereafter the scrambled command is collected and transmitted (steps 44 and 46). By scrambling an unsafe message, the unsafe message is converted into a safe message.

20

On the other hand if the received message is safe then no scrambling takes place and the message is transmitted in an unscrambled form to its destination.

If the filter has not been activated, so that the communication link is in its operational 25 mode, a test is carried out in step 56 to determine whether the received message is a scrambled unsafe message such as a scrambled fire or arm command. A scrambled message is unscrambled (step 58) and is then transmitted to its destination via the communication interface 24. If the message is not a scrambled unsafe message then, in step 52, a test is carried out to see if the message is an unsafe message in unscrambled 30 form. If the test result is affirmative then it is assumed that the message has been illegally generated and, as before, the message is scrambled (step 54) before being transmitted. If

the test result is negative then the message is transmitted in the received form to its destination via the communication interface 24.

It follows that the locking device 19 is used to bypass the filter 26 when it is safe to blast.

5 The bypass is achieved by hard wiring the communication around the filter or by the filter sensing the status of the switch and then, based on the status, filtering the dangerous commands out or unscrambling them.

If the filter has sufficient intelligence then it can send the arm and fire commands. It would
10 therefore not be possible for an unauthorised user to initiate a blast. This could only be achieved by deactivating the fire wall via the mechanical or locking device 19.

The control computer 12 may communicate directly with the filter 26. If there is no response from the filter then the control computer will not attempt communication with the
15 blasting network. The filter can thus act as a software dongle. If, as is the case with the Figure 4 embodiment, dangerous legal messages are scrambled then the filter must be activated for the system to operate.

It is to be noted that normal commands to query the blasting network and to determine the
20 status of components at the blasting site are unaffected. Once the blast area is clear the mechanical or electrical key is used to disable the filtering action and unblock the commands. The arm and fire commands may now be sent through the filter via the blast network to the blasting equipment. The control computer will scramble the dangerous commands. The filter, when unblocked, will correct the scrambled commands. If the filter
25 is deactivated the scrambled dangerous commands will be sent to the blasting network. The blasting network will disregard these commands.

In the Figure 4 embodiment, an illegally generated unsafe message, that is an unsafe message not generated by the blasting controller 12, would have to have the same
30 scrambled format as a legally generated scrambled unsafe message to initiate blasting once it has been unscrambled.

In the embodiments of the invention described with reference to Figures 3 and 4, the filter 26 is activated to place it in the safe or control mode in which unsafe messages can not be transmitted to the blasting network 16 and deactivated to place it in the unsafe or operational mode in which unsafe messages are transmitted. However, it is to be understood that the filter 26 may be one in which the safe or control mode is achieved by deactivating or otherwise switching the filter and the unsafe or operational mode is achieved by activating or otherwise switching the filter. In other words, what is important in this respect is merely that the filter can be switched between control and operational modes.

10

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described. It is to be understood that the invention includes all such variations and modifications which fall within its spirit and scope.

15

ART 34 AMDT

- 10 -

CLAIMS:

1. A method of controlling a blasting network which includes the steps of designating at least one unsafe message, placing a communication link between a control unit and the network in a control mode in which the communication link is monitored for the unsafe message, in said control mode preventing the unsafe message, when detected, from reaching the blasting network, and placing the communication link in an operational mode in which any previously designated unsafe message is allowed to reach the blasting network, and wherein in both the control mode and the operational mode any message which has not been designated as unsafe is permitted to be transmitted via the communication link.
2. A method according to claim 1 wherein in the control mode of the communication link the or each unsafe message is prevented from reaching the blasting network by preventing the onward transmission of the unsafe message.
3. A method according to claim 1 wherein in the control mode of the communication link the or each unsafe message is prevented from reaching the blasting network by scrambling the or each designated unsafe message so that it is no longer unsafe.
4. A method according to claim 3 which includes, in the operational mode of the communication link, the steps of detecting a scrambled unsafe message, unscrambling the detected scrambled unsafe message, and transmitting the unscrambled unsafe message to the blasting network.
5. A method according to any one of claims 1 to 4 which includes the step of designating at least two unsafe messages.
6. A method according to claim 5 wherein two designated unsafe messages are respectively equated with arm and fire commands.
7. A system for controlling a blasting network which includes a control unit and a communication link for the network, the communication link being capable of being placed in a control mode and in an operational mode, and a monitoring device for monitoring the communication link for at least one previously designated unsafe message,

ART 34 AMDT

wherein the communication link in its control mode prevents any detected unsafe message from being transmitted to the blasting network and in its operational mode permits any previously designated unsafe message to be transmitted to the blasting network, and wherein in both its control mode and its operational mode the communication link permits

5 any message which has not designated as unsafe to be transmitted via the communication link.

8. A control system according to claim 7 wherein in the control mode of the communication link the or each unsafe message, when detected, is ignored.

10

9. A control system according to claim 7 wherein the or each unsafe message, when detected, is scrambled.

15

10. A control system according to claim 9 wherein in the operational mode of the communication link any scrambled unsafe message is detected and unscrambled for transmission of the unscrambled unsafe message to the blasting network.

20

11. A control system according to any one of claims 7 to 10 wherein the control unit is capable of generating legal unsafe messages, which are transmitted via the communication link in its operational mode.

25 12. A control system according to any one of claims 7 to 11 wherein the monitoring device is a filter.

13.

13. A control system according to any one of claims 7 to 12 wherein the communication link is placed in its control and operational modes by means of a switch.

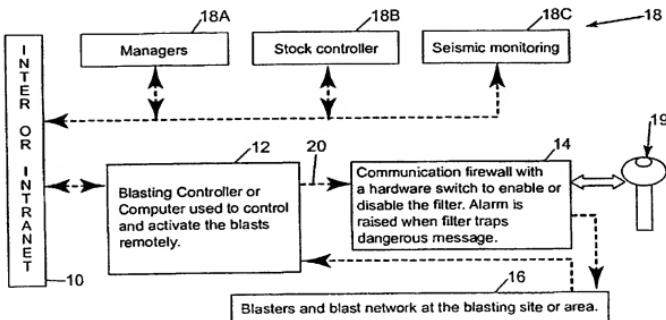
14. A blasting system including a control system according to any one of claims 7 to 13 connected to a blasting network.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

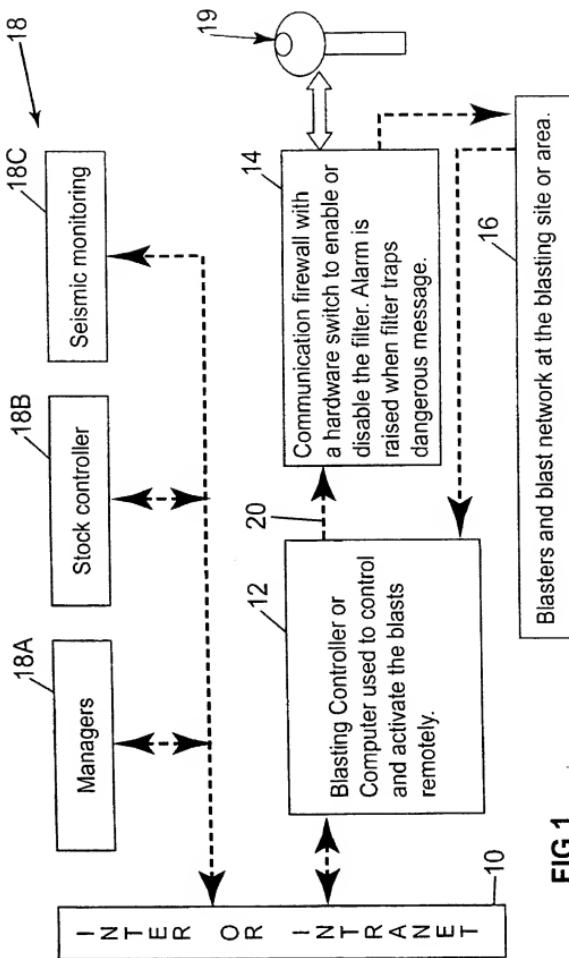
(51) International Patent Classification ⁷ : F42D 5/00, 1/045, F42C 15/42	A1	(11) International Publication Number: WO 00/63636 (43) International Publication Date: 26 October 2000 (26.10.00)
(21) International Application Number: PCT/AU00/00351		(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 20 April 2000 (20.04.00)		
(30) Priority Data: 99/2823 20 April 1999 (20.04.99) ZA	ZA	
(71) Applicant (for all designated States except US): EXPERT EXPLOSIVES (PROPRIETARY) LIMITED [ZA/ZA]; 30 High Street, 2065 Modderfontein (ZA).		
(71) Applicant (for AU only): HUNTSMAN, Peter, Harold [AU/AU]; 1 Little Collins Street, Melbourne, VIC 3000 (AU).		Published With international search report.
(72) Inventors; and		
(75) Inventors/Applicants (for US only): AGNE , Livia [RO/ZA]; 6 Phuto Avenue, Wilropark, 1724 Gauteng (ZA). PATZ, Vivian, Edward [ZA/ZA]; 344 Highland Road, Kensington, 2019 Johannesburg (ZA). HOOGENBOEZEM, Christiaan [ZA/ZA]; 76 Van Riebeck Ave., 1619 Kempton Park (ZA).		
(74) Agents: HUNTSMAN, Peter, Harold et al.; Davies Collison Cave, 1 Little Collins Street, Melbourne, VIC 3000 (AU).		

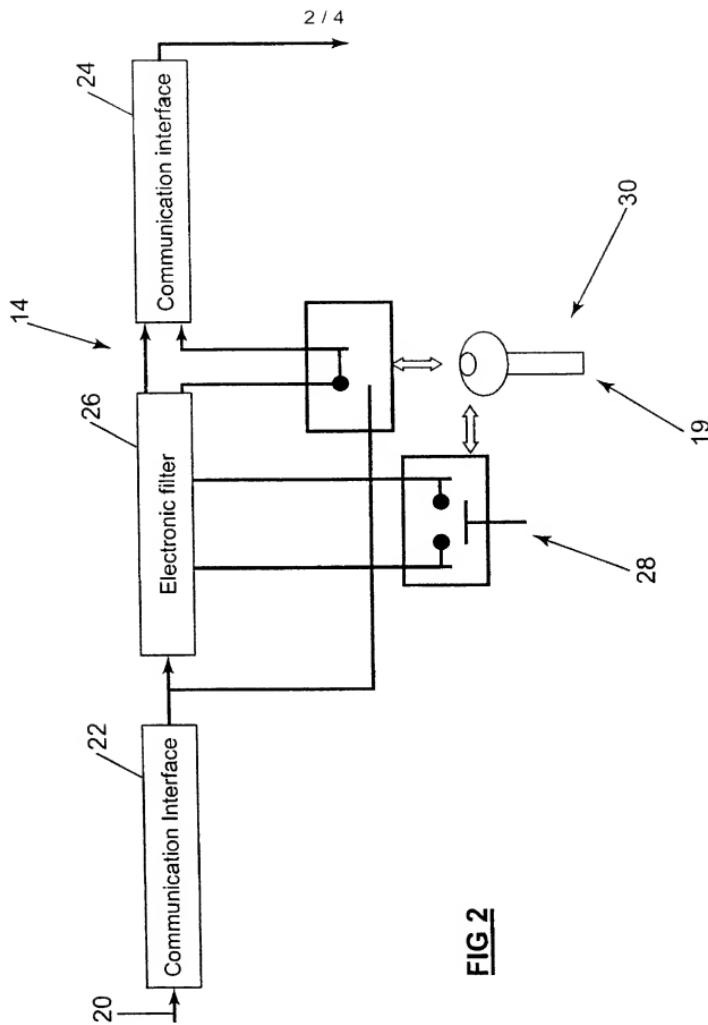
(54) Title: METHOD OF AND SYSTEM FOR CONTROLLING A BLASTING NETWORK



(57) Abstract

A method and system for controlling a blasting network (16) for use where spurious command signals may be passed through a blasting controller (12) to the blasting network, for example when the controller is connected to the Internet or Intranet (10). The system includes a firewall (14) whereby the communication link (20) between the controller and the blasting network can be placed in a control mode by a switch (19). In the control mode, any previously designated unsafe message such as a fire command is prevented from reaching the blasting network by, for example, disregarding the unsafe message or scrambling it so that it is no longer unsafe. In an operational mode of the communication link, any scrambled unsafe message may be unscrambled and any unsafe message may be transmitted to the blasting network.





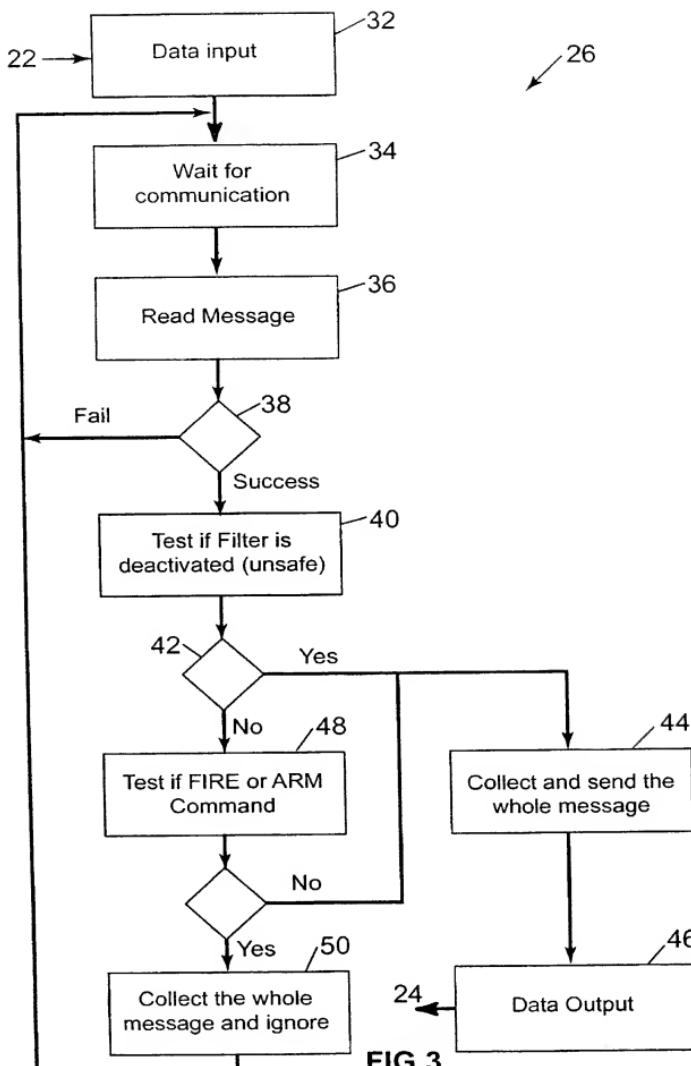


FIG 3

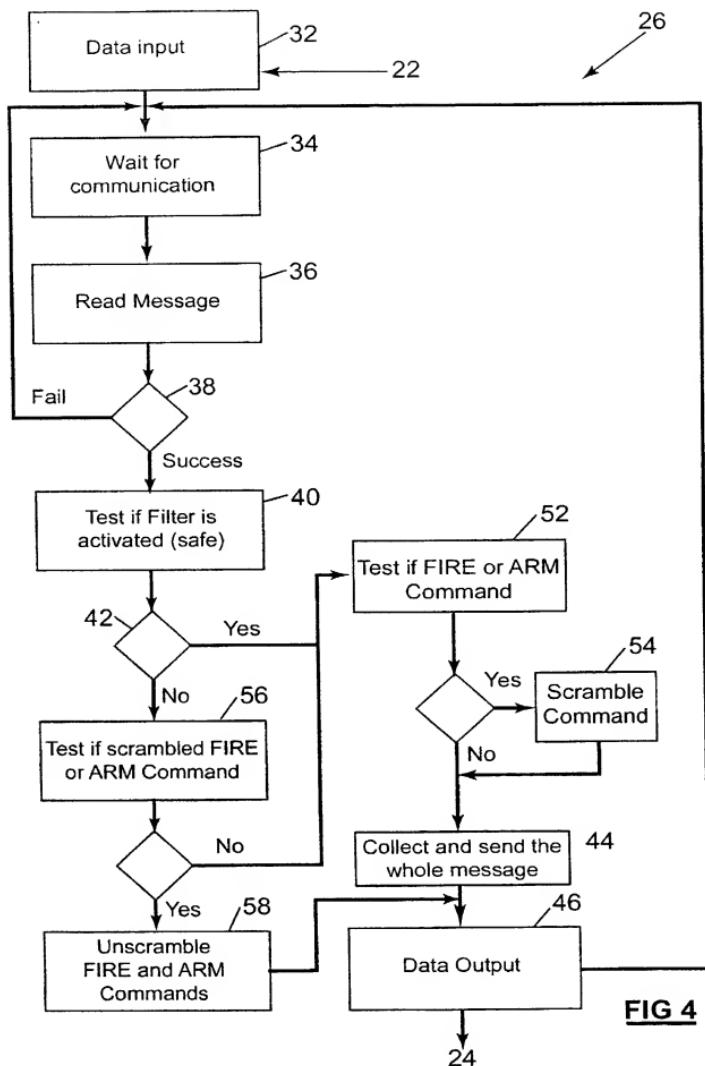


FIG 4

**JOINT INVENTORS' DECLARATION FOR PATENT APPLICATION
AND POWER OF ATTORNEY**

As the below named inventors, we hereby declare that:

Our residences, post office addresses and citizenship are as stated below our names.

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled "METHOD OF AND SYSTEM FOR CONTROLLING A BLASTING NETWORK," the specification of which was filed on April 20, 2000, as Application Serial No. PCT/AU00/00351, and amended on 26 February, 2001 and October 18, 2001;

We hereby authorize our legal representative to add reference to the Serial No. and/or filing date of the above-referenced application to this declaration.

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information that is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

Prior Foreign Application(s)

We hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application to which priority is claimed:

Country	Application No.	Date of Filing (day,month,year)	Date of Issue (day,month,year)	Priority Claimed 35 U.S.C.119
ZA	99/2823	20 APRIL 1999		YES
PCT	PCT/AU00/00351	20 April 2000		YES

Prior Provisional Application(s)

We hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

Application Serial Number	Date of Filing (day,month,year)
---------------------------	------------------------------------

NONE

Prior U.S. Application(s) and PCT International Application(s) Designating the United States

We hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or § 365(c) of any PCT International application(s) designating the United States listed below:

Application Serial Number	Date of Filing (day,month,year)	Status(Patented,Pending,Abandoned)
---------------------------	------------------------------------	------------------------------------

NONE

Insofar as the subject matter of each of the claims in this application is not disclosed in the prior United States, foreign or PCT International application(s) to which priority has been claimed above in the manner provided by the first paragraph of Title 35, United States Code, §112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

We hereby appoint, both jointly and severally, as our attorneys and agents with full power of substitution and revocation, to prosecute this application and any corresponding application filed in the Patent Cooperation Treaty Receiving Office, and to transact all business in the Patent and Trademark Office connected herewith the following attorneys and agents, their registration numbers being listed after their names:

Lorance L. Greenlee, Reg. No. 27,894; Ellen P. Winner, Reg. No. 28,547; Sally A. Sullivan, Reg. No. 32,064; Donna M. Ferber, Reg. No. 33,878; G. William VanCleave, Reg. No. 40,213; Susan K. Doughty, Reg. No. 43,595; Heeja Yoo-Warren, Reg. No. 45,495; Tamala R. Jonas, Reg. No. 47,688; Mary Beth Vellequette, Reg. No. 47,903; Jonathan A. Baker, Reg. No. 49,022; all of Greenlee, Winner and Sullivan, P.C., 5370 Manhattan Circle, Suite 201, Boulder, CO 80303.

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1. (1) Full Name of
First Inventor: DRAGNE, Livia
Residence: Randburg, South Africa ZAK
Citizenship: Romanian
Post Office Address: 26 Eagle Rock, Eastwood Avenue, Randpark Ridge ext 57, Randburg, South Africa
(1) Signature L. L. Dragne Date 18/12/2001

2. (2) Full Name of
Second Inventor: PATZ, Vivian Edward
Residence: Kensington, South Africa ZAK
Citizenship: South Africa
Post Office Address: 314 Highland Road, Kensington 2094, South Africa
(2) Signature _____ Date _____

3. (3) Full Name of
Third Inventor: HOOGENBOEZEM, Christiaan
Residence: Kempton Park, South Africa ZAK
Citizenship: South Africa
Post Office Address: 76 Van Riebeek Ave., 16119 Kempton Park, South Africa
(3) Signature _____ Date _____

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

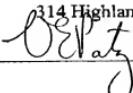
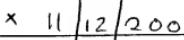
(1) Full Name of

First Inventor: DRAGNE, Livia
Residence: Randburg, South Africa
Citizenship: Romanian
Post Office Address: 26 Eagle Rock, Eastwood Avenue, Randpark Ridge ext 57, Randburg, South Africa

(1) Signature _____ Date _____

(2) Full Name of

Second Inventor: PATZ, Vivian Edward
Residence: Kensington, South Africa
Citizenship: South Africa
Post Office Address: 314 Highland Road, Kensington 2094, South Africa

(2) Signature  Date 

(3) Full Name of

Third Inventor: HOOGENBOEZEM, Christiaan
Residence: Kempton Park, South Africa
Citizenship: South Africa
Post Office Address: 76 Van Riebeeck Ave., 16119 Kempton Park, South Africa

(3) Signature _____ Date _____

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Full Name of

First Inventor: DRAGNE, Livia
Residence: Randburg, South Africa
Citizenship: Romanian
Post Office Address: 26 Eagle Rock, Eastwood Avenue, Randpark Ridge ext 57, Randburg, South Africa

(1) Signature _____ Date _____

(2) Full Name of

Second Inventor: PATZ, Vivian Edward
Residence: Kensington, South Africa
Citizenship: South Africa
Post Office Address: 314 Highland Road, Kensington 2094, South Africa

(2) Signature _____ Date _____

(3) Full Name of

Third Inventor: HOOGENBOEZEM, Christiaan
Residence: Kempton Park, South Africa
Citizenship: South Africa
Post Office Address: 76 Van Riebeeck Ave., 16119 Kempton Park, South Africa

(3) Signature *Hoogenboezem* Date *10/12/2001*